Abstract of the Disclosure

Alignment accuracy between two or more patterned layers is measured using a metrology target comprising substantially overlapping diffraction gratings formed in a test area of the layers being tested. An optical instrument illuminates all or part of the target area and measures the optical response. The instrument can measure transmission, reflectance, and/or ellipsometric parameters as a function of wavelength, polar angle of incidence, azimuthal angle of incidence, and/or polarization of the illumination and detected light. Overlay error or offset between those layers containing the test gratings is determined by a processor programmed to calculate an optical response for a set of parameters that include overlay error, using a model that accounts for diffraction by the gratings and interaction of the gratings with each others' diffracted field. The model parameters might also take account of manufactured asymmetries. The calculation may involve interpolation of pre-computed entries from a database accessible to the processor. The calculated and measured responses are iteratively compared and the model parameters changed to minimize the difference.